ShenZhen Mellow Technology Co., Limited

ML8021 GPRS Modem User's Manual

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1 Introduction

This document defines the ML8021 module series and describes the hardware interface of the ML8021 module that connects to the customer application and the hardware interface.

This document can help customer quickly understand module interface specifications, electrical and mechanical details. With the help of this document, associated application notes and user guide, customer can use ML8021 module to design and set up mobile applications quickly.

2 Product concept

The ML8021 is a Quad-band GSM/GPRS engine that works at frequencies GSM850MHz, GSM900MHz, DCS1800MHz and PCS1900MHz. The ML8021 features GPRS multi-slot class 12 and supports the GPRS coding schemes CS-1, CS-2, CS-3 and CS-4.

The ML8021 is integrated with Internet service protocols, which are TCP/UDP, FTP and HTTP.

Extended AT commands have been developed for customer to use these Internet service protocols easily. The modules are fully RoHS compliant to EU regulation.

Table 1 Module key features

Feature	Implementation
Power supply	Single supply voltage 5.0V – 12V,
Frequency bands	● Quad-band: GSM850, GSM900, DCS1800, PCS1900. ● The module can search these frequency bands automatically ● The frequency bands can be set by AT command. ● Compliant to GSM Phase 2/2+
Transmitting power	● Class 4 (2W) at GSM850 and GSM900 ● Class 1 (1W) at DCS1800 and PCS1900
GPRS connectivity	● GPRS multi-slot class 12 (default) ● GPRS multi-slot class 1~12 (configurable) ● GPRS mobile station class B
Temperature range	● Normal operation: -35°C ~ +80°C ● Restricted operation: -45°C ~ -35°C and +80°C ~ +85°C [1)] ● Storage temperature: -45°C ~ +90°C
DATA GPRS:	● GPRS data downlink transfer: max. 85.6 kbps ● GPRS data uplink transfer: max. 85.6 kbps

CSD:	● Coding scheme: CS-1, CS-2, CS-3 and CS-4 ● Support the protocols PAP (Password Authentication Protocol) usually used for PPP connections ● Internet service protocols TCP/UDP/FTP/HTTP/MMS ● Support Packet Switched Broadcast Control Channel (PBCCH) ● CSD transmission rates: 2.4, 4.8, 9.6, 14.4 kbps non-transparent ● Unstructured Supplementary Services Data (USSD) support
SMS	● MT, MO, CB, Text and PDU mode ● SMS storage: SIM card
FAX	Group 3 Class 1 and Class 2
SIM interface	Port SIM card: 1.8V, 3V, Protected against ESD with a TVS diode array.
Serial interface	● Support from 4800 bps to 115200 bps, default auto baud rate ● Support TTL/RS232/RS485 ● Embed standard AT command（GSM07.05 and 07.07）
Phonebook management	Support phonebook types: SM, FD, LD, RC, ON, MC
SIM Application Toolkit	Support SAT class 3, GSM 11.14 Release 99
Physical characteristics	79*53*21mm

1) When the module works in this temperature range, the deviations from the GSM specification might occur. For example, the frequency error or the phase error could increase.

Table 2 Coding schemes and maximum net data rates over air interface

Coding scheme	1 Timeslot	2 Timeslot	4 Timeslot
CS-1:	9.05kbps	18.1kbps	36.2kbps
CS-2:	13.4kbps	26.8kbps	53.6kbps
CS-3:	15.6kbps	31.2kbps	62.4kbps
CS-4:	21.4kbps	42.8kbps	85.6kbps

3 Application interface

3.1Pin description

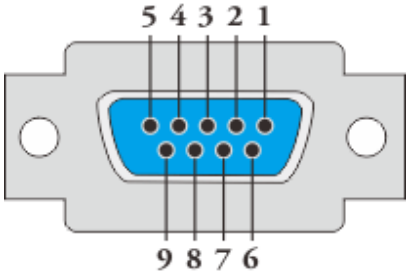


Table 3 Pin description

PIN	TTL	RS-232	RS-485
1	NC	NC	NC
2	TXD	TXD	A
3	RXD	RXD	B
4	NC	NC	NC
5	GND	GND	GND
6	NC	NC	NC
7	NC	CTS	NC
8	NC	RTS	NC
9	NC (Power for Option)	NC (Power for Option)	NC (Power for Option)

3.2 Operating modes

The table below briefly summarizes the various operating modes referred to in the following chapters.

Table 4 Overview of operating modes

Mode	Function	
Normal operation	GSM/GPRS SLEEP	The module will automatically go into SLEEP mode if DTR is set to high level and there is no interrupt (such as GPIO interrupt or data on serial port). In this case, the current consumption of module will reduce to the minimal level.

		During SLEEP mode, the module can still receive paging message and SMS from the system normally.
	GSM IDLE	Software is active. The module has registered to the GSM network, and the module is ready to send and receive.
	GSM TALK	GSM connection is going. In this mode, the power consumption is decided by the configuration of Power Control Level (PCL), dynamic DTX control and the working RF band.
	GPRS IDLE	The module is not registered to GPRS network. The module is not reachable through GPRS channel.
	GPRS STANDBY	The module is registered to GPRS network, but no GPRS PDP context is active. The SGSN knows the Routing Area where the module is located at.
	GPRS READY	The PDP context is active, but no data transfer is going on. The module is ready to receive or send GPRS data. The SGSN knows the cell where the module is located at.
	GPRS DATA	There is GPRS data in transfer. In this mode, power consumption is decided by the PCL, working RF band and GPRS multi-slot configuration.
POWER DOWN	Normal shutdown by sending the "AT+QPOWD=1" command, using the PWRKEY pin. The power management ASIC disconnects the power supply from the base band part of the module, and only the power supply for the RTC is remained. Software is not active. The serial interfaces are not accessible. Operating voltage (connected to VBAT) remains applied.	
Minimum functionality mode (without removing power supply)	Use the "AT+CFUN" command can set the module to a minimum functionality mode without removing the power supply. In this case, the RF part of the module will not work or the SIM card will not be accessible, or both RF part and SIM card will be closed all, but the serial port is still accessible. The power consumption in this case is very low.	

Note: The module is set to auto baud rate mode (AT+IPR=0) in default configuration. In the auto baud rate mode, the URC "RDY" after powering on is not sent to host controller. AT command can be sent to the module 2-3 seconds after the module is powered on. Host controller should firstly send an "AT" or "at" string in order that the module can detect baud rate of host controller, and it should send the second or the third "AT" or "at" string until receiving "OK" string from module. If you need to using fixed baud rate, Then an "AT+IPR=x; &W" should be sent to module and save the configuration to flash memory of module. After these

configurations, the URC "RDY" would be received from the Serial Port of module every time when the module is powered on. Refer to Chapter "AT+IPR" in AR command manual.

3.3 LED indication

3.3.1 Red Led is the power indicates.

3.3.2 Yellow Led is the RING indicates.

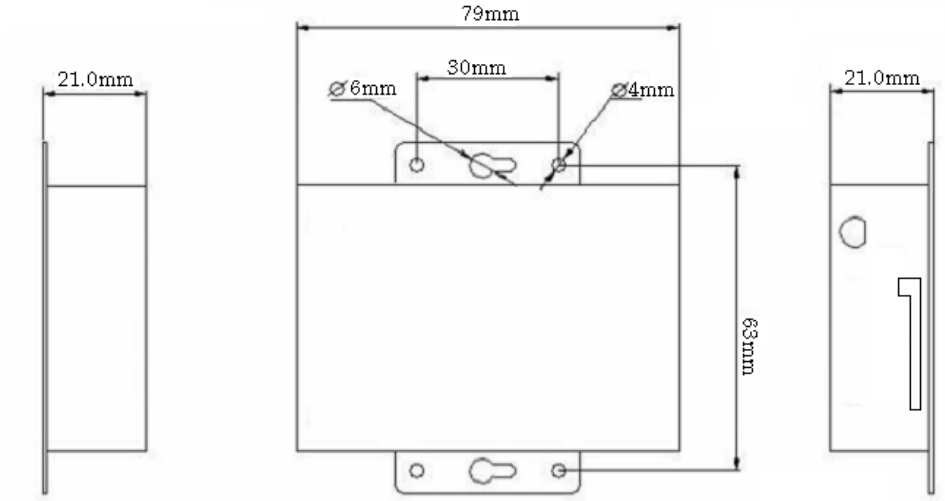
3.3.3 Green Led is the Working state indicates.

The Working state of this LED is list in the table 6.

Table 6 Working state of the Green LED

state	Module Function
Off	The module is not running(Power Off)
64ms On/800ms Off	The module is not synchronized with network
64ms On/2000ms Off	The module is synchronized with network
64ms On/600ms Off	GPRS data transfer is ongoing.

4 Mechanical dimension



5 Product List

Name	Unit	Quantity	Describe	Picture
ML8021	Item	1	Module	
Antenna	Item	1	Standard Supply	
Power Adapter	Item	1	DC 5V 2A	
RS-232 Cable	Item	1	Standard Supply	